

1 **DOOR LEAF GUIDING ASSEMBLY OF A STACKING SYSTEM FOR**
2 **LATERALLY FOLDING DOORS**

3 **BACKGROUND OF THE INVENTION**

4 1. Field of the Invention

5 The present invention relates to a door leaf guiding assembly of a
6 stacking system for folding doors, and more particularly to a door leaf guiding
7 assembly that uses multiple divisions of a chain to be a top roller and a bottom
8 roller for a door leaf to move on a stacking bracket to arrange the door leaf in a
9 stack, and the door leaf guiding assembly is durable and low cost.

10 2. Description of Related Art

11 Overhead folding doors are constructed of folding door leaves or panels
12 and can be commonly found in residential garages. One kind of the overhead
13 folding door comprises multiple door leaves that are partially overlapped
14 sequentially to close the door and a stacking system to arrange the door leaves
15 into a stack while the door is opened.

16 With reference to Figs. 6 and 7, a conventional overhead folding door
17 comprises an overhead frame (50), two side walls (51), two side tracks (A),
18 multiple door leaves (80) and a stacking system (60). The overhead frame (50)
19 has two sides (not numbered) and an inner space (not numbered). The side walls
20 (51) are respectively attached to the sides of the overhead frame (50). The side
21 tracks (A) respectively connect to the overhead frame (50) at the sides. The door
22 leaves (80) are movably held in sequence in the side tracks (A) while the door is
23 closed.

24 Each of the door leaves (80) has two opposite ends (not numbered), a top

1 edge (not numbered) and a bottom edge (not numbered). The ends of the door
2 leaves (80) are respectively held in the side tracks (A). The top edge is
3 overlapped partially with the bottom edge of the adjacent door leaf (80). The
4 door leaves (80) will be arranged in the inner space of the overhead frame (50)
5 by the stacking system (60).

6 The stacking system (60) comprises a motor (64), a power transmission
7 assembly (not numbered), two stacking brackets (not numbered) and a door leaf
8 guiding assembly (not numbered). The motor (64) is mounted on the overhead
9 frame (50) at one of the sides. The power transmission assembly connects to the
10 motor (64) to transmit the outputting power of the motor (64) to lift the door
11 leaves (80) and comprises two transmission mechanisms (not numbered) and a
12 transmission shaft (63). The transmission mechanisms are respectively mounted
13 at the sides of the overhead frame (50) and each comprises a driving chainwheel
14 assembly (62), a driven chainwheel assembly (not numbered), a transmission
15 chain (65) and a door leaf lifting chain (68). The transmission shaft (63) connects
16 to both the transmission mechanisms so that they can work simultaneously.

17 The driving chainwheel assembly (62) is rotatably mounted on the side
18 wall (51) and comprises a motor driven chainwheel (not numbered) and a driving
19 chainwheel (not numbered). The chainwheels are connected concentrically to
20 each other. The motor driven chainwheel is rotated by the motor (64) by means
21 of a chain. The driving chainwheel connects to the driven chainwheel assembly
22 with the transmission chain (65).

23 Likewise, the driven chainwheel assembly comprises a chain driven
24 chainwheel (66) and a door leaf driving chainwheel (67). The chainwheels

1 (66,67) are connected concentrically to each other. The chain driven chainwheel
2 (66) connects to the driving chainwheel with the transmission chain (65) and is
3 rotated by the driving chainwheel. The door leaf lifting chain (68) meshes with
4 the door leaf driving chainwheel (67) of the driven chainwheel assembly and has
5 a stationary end (not numbered) and a movable end (not numbered). The
6 stationary end is fastened on the stacking bracket. The movable end extends into
7 one of the side tracks (A) to lift the door leaves (80).

8 With reference to Figs. 7 and 8, the door leaf guiding assembly
9 comprises two top guiding brackets (73) and multiple roller assemblies (not
10 numbered). The top guiding brackets (73) are respectively mounted on the side
11 tracks (A) and each has a slot (72). The slot (72) has a bottom opening (not
12 numbered) and a top opening (not numbered). The bottom opening faces one of
13 the side tracks (A).

14 The roller assemblies are respectively mounted at the ends of the door
15 leaves (80) and each comprises a top roller bracket (not numbered), a top roller
16 (81), a bottom roller bracket (84), a bottom roller (83) and a chain roller (82).
17 The top roller bracket is mounted on the end of the door leaf (80) adjacent to the
18 top edge and fastened pivotally to one link of the door leaf lifting chain (68). The
19 top roller (81) is rotatably mounted on the top roller bracket. The bottom roller
20 bracket (84) is mounted on the end of the door leaf (80) adjacent to the bottom
21 edge. The bottom roller (83) and the chain roller (82) are rotatably mounted on
22 the bottom roller bracket (84), where the bottom roller (83) is between the chain
23 roller (82) and the end of the door leaf (80). The chain roller (83) rotatably abuts
24 on the door leaf lifting chain (68) to smooth the door leaf lifting chain (68)

1 during operation.

2 The stacking brackets are respectively mounted in the overhead frame
3 (50) adjacent to the side walls (51) and each comprises a top roller rail (70) and a
4 bottom roller rail (71). The top and the bottom roller rails (70, 71) are fastened on
5 the top guiding bracket (73), have respectively a top edge (not numbered) and are
6 parallel to each other. The top edge of the bottom roller rail (71) is sited under the
7 top opening of the slot (72).

8 When the door leaf lifting chains (68) of the two transmission
9 mechanisms are moved upward, the door leaves (80) will be moved
10 simultaneously upward. The bottom rollers (83) of the top one of the door leaves
11 (80) will be guided into the slots (72). The slots (72) guide the door leaf (80) to
12 move into the inner space of the overhead frame (50) between the top and the
13 bottom roller rails (70, 71). The top and the bottom rollers (81, 83) respectively
14 roll on the top edges of the top and the bottom roller rails (70, 71). To
15 continuously operate the door leaf lifting chains (68) will repeatedly move each
16 of the door leaves (80) and arrange the door leaves (80) in a stack on the top and
17 the bottom roller rails (70, 71).

18 However, the top and the bottom rollers (81, 83) and the chain roller (82)
19 in accordance with prior art are made of plastic. The plastic rollers (81, 82, 83)
20 are not durable and after a long-term and repeated use, the plastic rollers (81, 82,
21 83) will be easily damaged and worn. If metal rollers are used to replace the
22 plastic rollers (81, 82, 83), additional cost is incurred in fabricating the metal
23 rollers.

24 To overcome the shortcomings, the present invention provides an

1 improved door leaf guiding assembly of a stacking system to mitigate or obviate
2 the aforementioned problems.

3 SUMMARY OF THE INVENTION

4 The main objective of the invention is to provide a door leaf guiding
5 assembly of a stacking system for a folding door, and the door leaf guiding
6 assembly is durable and low in cost.

7 To achieve the aforesaid objective, a door leaf guiding assembly of a
8 stacking system for a folding door includes two top guiding brackets, two
9 stacking brackets and multiple roller assemblies. The folding door includes
10 multiple door leaves each having two opposite ends, and two side tracks
11 movably hold the ends of the door leaves. The top guiding brackets are
12 respectively mounted on the side tracks and each has a slot to guide the door
13 leaves onto the stacking brackets. The stacking brackets are respectively
14 mounted on the top guiding brackets. The roller assemblies are respectively
15 mounted on the ends of the door leaves and each includes a top roller and bottom
16 roller assembly that uses conventional chain divisions to let the door leaves roll
17 on the stacking brackets as the door leaves are arranged in a stack on the stacking
18 brackets. Therefore, the roller assemblies are durable and incur a low
19 manufacture cost for the roller assemblies.

20 Other objectives, advantages and novel features of the invention will
21 become more apparent from the following detailed description when taken in
22 conjunction with the accompanying drawings.

23 BRIEF DESCRIPTION OF THE DRAWINGS

24 Fig. 1 is a plan view of a stacking system uses a door leaf guiding

1 assembly in accordance with the present invention;

2 Fig. 2 is a perspective view of a segment of the stacking system in Fig. 1;

3 Fig. 3 is an exploded perspective view of a roller assembly in accordance
4 with the present invention;

5 Fig. 4 is a perspective view of the roller assembly in Fig. 3;

6 Fig. 5 is an operational side plan view of the stacking system when a side
7 wall is removed from an overhead frame;

8 Fig. 6 is a perspective view of a folding door in accordance with the prior
9 art;

10 Fig. 7 is a side plan view of a stacking system in accordance with the
11 prior art; and

12 Fig. 8 is a plan view of a roller assembly in accordance with the prior art.

13 **DETAILED DESCRIPTION OF PREFERRED EMBODIMENT**

14 An embodiment in accordance with the present invention is a
15 modification of the door leaf guiding assembly described previously in the
16 description of related art. A door leaf guiding assembly in accordance with the
17 present invention is constructed in a conventional overhead folding door
18 described previously in the description of related art.

19 With reference to Figs. 1, 2 and 3, the overhead folding door comprises
20 an overhead frame (50) with two side walls (51), two side tracks (A), multiple
21 door leaves (80) and a stacking system (20) as previously described. Each of the
22 door leaves (80) has a top edge (not numbered), a bottom edge (not numbered)
23 and two opposite ends (not numbered). The stacking system (20) comprises a
24 motor (64), a power transmission assembly (not numbered), two stacking

1 brackets (not numbered) and a door leaf guiding assembly (not numbered). The
2 power transmission assembly has a door leaf lifting chain (68). The door leaf
3 lifting chain (68) is constructed in a conventional manner. The overhead frame
4 (50), the two side walls (51), two side tracks (A), the door leaves (80), the motor
5 (64) and the power transmission assembly are constructed in a conventional
6 manner, therefore, a detailed description is not provided further.

7 The door leaf guiding assembly in accordance with the present invention
8 comprises two conventional top guiding brackets (73) and multiple roller
9 assemblies (not numbered). The top guiding brackets (73) are respectively
10 mounted on the side tracks (A) and each has a slot (72). The slot (72) has a
11 bottom opening (not numbered) and a top opening (not numbered). The bottom
12 opening faces one of the side tracks (A).

13 With reference to Figs. 4 and 5, the roller assembly in accordance with
14 the present invention is mounted at the end of the door leaf (80) and comprises a
15 top roller assembly (not numbered) and a bottom roller assembly (not numbered).
16 The top roller assembly comprises a top mounting bracket (41), a top chain link
17 (44), a connecting chain link (45) and a fastener (43), such as a bolt. The top
18 mounting bracket (41) is mounted on the end of the door leaf (80) and has a side
19 (not numbered). The top chain link (44) is attached to the side of the top
20 mounting bracket (41) and may be a division of a roller chain. The connecting
21 chain link (45) is stacked on the top chain link (44) and comprises two divisions
22 of a chain, such as a roller chain. The divisions of the connecting chain link (45)
23 pivotally connect to each other at a joint (451). One of the divisions of the
24 connecting chain link (45) pivotally connects to the door leaf lifting chain (68).

1 The fastener (43) passes through the joint (451) of the connecting chain link (45),
2 extends into the top chain link (44) and fastens on the top mounting bracket (41).

3 The bottom roller assembly comprises a bottom mounting bracket (42),
4 an inside chain link (46) and an outside chain link (47). The bottom mounting
5 bracket (42) is mounted on the end of the door leaf (80) and has a side (not
6 numbered). The inside chain link (46) and the outside chain link (47) are two
7 separated divisions of a chain, such as a roller chain. The inside chain link (46) is
8 mounted on the side of the bottom mounting bracket (42). The outside chain link
9 (47) is attached on the inside chain link (46) and is arranged with the inside chain
10 link (46) in a stack.

11 The stacking brackets in accordance with the present invention are
12 respectively mounted in the overhead frame (50) adjacent to the side walls (51)
13 and each comprises a conventional top roller rail (70), a conventional bottom
14 roller rail (71) and an auxiliary bottom roller rail (74). The top and the bottom
15 roller rails (70, 71) are respectively mounted on the top guiding bracket (73),
16 have respectively a top edge (not numbered) and are parallel to each other. The
17 auxiliary bottom roller rail (74) is mounted on the top guiding bracket (73)
18 between the top and the bottom roller rails (70, 71) and has a bottom edge (not
19 numbered). The bottom edge of the auxiliary bottom roller rail (74) is parallel to
20 the top edge of the bottom roller rail (71), and forms a channel (75)
21 communicated with the top opening of the slot (72).

22 Therefore, when the door leaf lifting chains (68) of the two transmission
23 mechanisms are moved upward, the door leaves (80) will be moved
24 simultaneously upward. The individual inside chain link (46) on the top one of

1 the door leaves (80) will be guided to move into the slot (72). The slot (72)
2 guides the inside chain link (46) to move into the channel (75) so that the door
3 leaf (80) will move into the inner space of the overhead frame (50) on the top and
4 the bottom roller rails (70, 71). The top and the inside chain links (44,46)
5 respectively roll or slide on the top edges of the top and the bottom roller rails
6 (70, 71). To continuously operate the door leaf lifting chains (68) will repeatedly
7 move the door leaves (80) and arrange the door leaves (80) in a stack on the top
8 and the bottom roller rails (70, 71).

9 Since the top chain link (44), the connecting chain link (45), the inside
10 chain link (46) and the outside chain link (47) are divisions of a conventional
11 chain, each of them is simple and cheap to manufacture. Also, to connect the
12 chain links (44, 45, 46, 47) to the door leaf lifting chain (68) or one by another is
13 easy. Therefore, the door leaf guiding assembly is durable and of low cost.

14 Even though numerous characteristics and advantages of the present
15 invention have been set forth in the foregoing description, together with details
16 of the structure and function of the invention, the disclosure is illustrative only,
17 and changes may be made in detail, especially in matters of shape, size, and
18 arrangement of parts within the scope of the appended claims.